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ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP
1725 K STREET, NW
SUITE 1000
WASHINGTON, DC 20006

EXAMINER	
MORAN, MARJORIE A	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/768,180	FUJIHARA ET AL.	
	Examiner	Art Unit	
	Marjorie Moran	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *3,5,7-10 and 13-18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6,11,12,19 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Election/Restrictions

Claims 3, 5, 7-10, and 13-18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 6/5/06.

It is again noted that an electronic device, specifically a transistor, comprising DNA "modified" with (interpreted to be complexed with or bound to) TPD is free of the prior art, therefore the search was expanded to another hole transporting functional group, phenothiazine.

An action on the merits of claims 1, 2, 4, 6, 11, 12, 19, and 20, as they read on the elected species of DNA, positive-hole transporter, and transistor, follows. All objections and rejections not reiterated below are hereby withdrawn.

Priority

Applicant is reminded that should applicant desire to obtain the benefit of foreign priority under 35 U.S.C. 119(a)-(d), a translation of the foreign application should be submitted under 37 CFR 1.55 in reply to this action. It is noted that no such translation was received in reply to the last office action, therefore priority for the instant claims is granted only to the filing date of the instant application, of 2/2/04.

Specification

The abstract of the disclosure is again objected to because the first "sentence" is incomplete.

In response to the argument filed 2/23/07 that the abstract need not contain full sentences, applicant is reminded that the abstract is considered to be part of the specification, and as such, must comply with normal grammatical rules for the English language. Further, MPEP 608.01 (b), in section C, states that, "The abstract should be in narrative form and generally limited to a single paragraph within the range of 50 to 150 words."

In response to the argument that certain phrases are discouraged, it is noted that while PHRASES are discouraged, use of proper grammar is not. Given the plethora of nouns and verbs in use in the English language, it is certainly possible to present an abstract of an invention in full sentences using acceptable phrases; e.g. "The invention is an electronic device which comprises.... "

A properly written paragraph in the English language comprises full sentences. The instant abstract comprises a sentence fragment, therefore the objection is maintained. Appropriate correction is still required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 12 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Amended claim 12 recites the phrase "to said biopolymer" in line 4. It appears that a term is missing or that a typographical error was made in amendment, as it is unclear what is intended to {happen? be attached?} to the biopolymer. For purposes of search and applying the prior art, claim 12 is interpreted to limit a functional element to a conductive wire with the recited functional groups "periodically contained therein." Claim 19 depends from claim 12 and is therefore also indefinite.

In view of the argument that Claim 20 now recites a functional limitation of the device; i.e. a FET which is capable of being controlled by applying an electric field, the rejection of claim 20 under 35 USC 112 is hereby withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 4, 6, 11, 12, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over WATANABE et al. (US 6,486,489 in view of TIERNEY et al. (J. Org. Chem. (2000) vol. 65, pp. 5355-5359).

WATANABE teaches a transistor comprising DNA wires; i.e. carrier transporting material (col. 12, lines 11-26). It is noted that WATANABE specifically teaches that DNA is a carrier transporting material in col. 5, lines 19-26), and teaches application of an electric current to the DNA (col. 5, lines 25-26). WATANABE further teaches that his transistor may be a FET (col. 6, lines 40-42 and col. 8, lines 20-26) and that his DNA may be a block (col. 8, lines 20-26 and col. 11, lines 12-21). WATANABE does not teach DNA complexed with a positive hole-transporter.

TIERNEY teaches DNA complexed with phenothiazine, and teaches that such complexes are more stable than unlabeled (DNA) duplexes and may be used for charge transfer (p. 5358).

It would have been obvious to one of ordinary skill in the art at the time of invention to have used the phenothiazine-complexed DNA of TIERNEY in the transistor of WATANABE where the motivation would have been to improve the transistor by using a more stable DNA duplex which retains properties similar to the DNA used by WATANABE.

Applicant's arguments filed 2/23/07 have been fully considered but they are not persuasive. In response to the argument that WATANABE does not specifically teach a "DNA wire," it is noted that WATANABE does teach that DNA may be a carrier transporter to which an electric current may be applied, as set forth above. It is noted that applicant admits on page 10 of the response that the invention of WATANABE "relies upon the electrical conductivity of DNA itself." Further, WATANABE teaches construction of transistors with and without DNA, wherein the transistor with DNA allows formation of a "substantially perfect" FET (col. 11, line 43-col. 12, line 5) controlled by an outside electric field. Those skilled in the art generally accept that a carrier transporting material is a wire, and that DNA may be so defined. The prior art of KEEN (US 6,060,327, col. 8, lines 26-51) provides support for the examiner's position that DNA which transports charges in a device such as a FET is considered a "wire."

The argument on page 10 of the response that "an electrical conductivity of the DNA itself is not always essential to the present invention," is confusing as instant claim 6 specifically limits the functional element of claim 1 to be an "electrically conductive wire."

In response to the argument that the invention is an improvement in the art, it is noted that the clams are not directed to a method, therefore argument regarding continuously carrying out redox modification is not persuasive. Further, the claims do not recite electrodes, so the argument that the redox modification occurs near electrodes is moot. Also with regard to an "improvement," applicant is reminded that the rejection states that it would have been obvious to have improved the device of

WATANABE by using the more stable DNA as taught by TIERNEY for the reasons set forth above. Applicant has not provided any evidence that the CLAIMED invention is, in fact, an improvement over the device made obvious by WATANABE and TIERNEY.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., disposing "redox" or functional groups or "side chains" in an "adjacent position") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to the argument that TIERNEY"s redox functional groups are attached to the ends of DNA, and are not "continuously introduced" as set forth on page 11 of the response, it is noted that the only claim which recites a limitation with regard to spacing or geometry of functional groups is claim 12. Claim 12 does not limit the functional groups to be "continuously introduced" but limits a wire to one wherein functional groups are "periodically" contained therein. Functional groups attached to ends of a molecule are indeed "periodically" placed, wherein the "period" is the length of the molecule, therefore the argument is not persuasive as applied to the instant claims.

For the reasons set forth above, the examiner maintains that WATANABE in view of TIERNEY teach and/or make obvious all of the limitations of the instant claims, and the rejection is maintained.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over WATANABE et al. (US 6,486,489 in view of TIERNEY et al. (J. Org. Chem. (2000) vol. 65, pp. 5355-5359) as applied to claims 1, 2, 4, 6, 11, 12, 19, and 20 above, and further in view of KRONLAGE (GB 1278281).

WATANABE and TIERNEY make obvious a transistor, specifically a FET, comprising DNA complexed with phenothiazine, as set forth above. WATANABE and TIERNEY do not specifically teach a transistor with a PHP or NPN junction.

KRONLAGE teaches FET transistors with PNP and NPN junctions (Page 3, lines 95-99).

It would have been obvious to one of ordinary skill in the art at the time of invention to have made any type of FET transistor as made obvious by WATANABE and TIERNEY, including one with PNP and/or NPN junctions, as taught by KRONLAGE where the motivation would have been to optimize performance of the transistor, as taught by KRONLAGE (page 3, lines 118-121).

Applicant's arguments filed 2/23/07 have been fully considered but they are not persuasive. In response to the argument that KRONLAGE does not teach a biopolymer or polymer that meets the limitations of the claims, applicant is reminded that the rejection is made over a combination of references wherein both WATANABE and TIERNEY teach DNA (a biopolymer specifically recited in claim 2). In response to the argument that there is no specific suggestion in KRONLAGE to modify WATANABE, and that the motivation for combining is unclear, applicant's attention is directed to the

rejection, reiterated above, which states "where the motivation would have been to optimize performance of the transistor, as taught by KRONLAGE (page 3, lines 118-121)." In response to the argument that Claim 19 depends from claim 12, and that there is no disclosure of or suggestion for the periodic structure of the claimed functional groups, the examiner maintains that TIERNEY does teach periodic disposal of his functional groups on his DNA, as set forth above. In response to the argument that it is not clear what structural modification is being suggested by KRONLAGE's "general disclosure" of FET transistors, applicant's attention is again directed to the rejection reiterated above, which states that it would have been obvious to have made a FET transistor "including one with PNP and/or NPN junctions, as taught by KRONLAGE", thus the rejection clearly sets forth the modification made obvious by KRONLAGE.

For the reasons set forth above, applicant's arguments are not persuasive, and the rejection is maintained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marjorie Moran whose telephone number is 571-272-0720. The examiner can normally be reached on M-F 6:30 am- 2 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on 571-272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Marjorie Moran
Primary Examiner
Art Unit 1631

Marjorie A. Moran
5/13/07